Paper No. 31

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte KALIPATNAM V. RAO

Appeal No. 1997-3688
Application 08/113,887

ON BRIEF

Before KRASS, FLEMING, and GROSS, **Administrative Patent Judges.**

FLEMING, **Administrative Patent Judge.**

DECISION ON APPEAL

This is an decision on appeal from the final rejection of claims 27, 31 and 32. Claims 1 through 21 have been withdrawn from consideration. Claims 22, 24 through 26, 28 and 29 have been allowed.[1]

The invention relates to semiconductor LOCOS isolation methods and regions.

Independent claim 27 is reproduced as follows:

[1] Claim 30 depends from allowed claim 28. Neither the Appellant's brief or Examiner's answer discusses the status of this calim.

27. A method for forming a semiconductor device, comprising the steps of:

providing a semiconductor body;

forming a first silicon nitride layer over said semiconductor body;
forming a polysilicon layer on said first silicon nitride layer;

forming a second silicon nitride layer on said polysilicon layer;

removing portion of said second silicon nitride layer, said polysilicon layer, and said first silicon nitride layer to define an active moat region and to expose an inverse moat region;

forming a silicon nitride sidewall seal abutting said first and second silicon nitride layers and said polysilicon layer on said active moat region; and

forming a trench with a sidewall and a bottom in said semiconductor body adjacent to said silicon nitride sidewall seal.

The Examiner relies on the following references:

Bryant et al. (Bryant)	4,981,813	Jan. 1, 1991
Japan Kokai (Saito)	62-71247	Apr. 1, 1987
Japan Kokai (Koto)	63-137457	June 9, 1988

Wolf et al. (Wolf), “Silicon Processing for the VLSI Era,” **Process Technology**, Vol. 1, Lattice Press, pp. 523-29 (1986)

Claims 27, 31 and 32 stand rejected under 35 U.S.C. § 103 as being unpatentable over the combination of Saito, Koto, Bryant and Wolf.

Rather than reiterate the arguments of Appellant and the Examiner, reference is made to the brief and answer for the respective details thereof.

OPINION

We will not sustain the rejection of claims 27, 31 and 32 under 35 U.S.C. § 103.

The Examiner has failed to set forth a **prima facie** case. It is the burden of the Examiner to establish why one having ordinary skill in the art would have been led to the claimed invention by the express teachings or suggestions found in the prior art, or by implications contained in such teachings or suggestions. **In re Sernaker**, 702 F.2d 989, 995, 217 USPQ 1, 6 (Fed. Cir. 1983). "Additionally, when determining obviousness, the claimed invention should be considered as a whole; there is no legally recognizable 'heart' of the invention." **Para-Ordnance Mfg. Inc. v. SGS Importers Int'l Inc.**, 73 F.3d 1085, 1087, 37 USPQ2d 1237, 1239 (Fed. Cir. 1995), **cert. denied**, 519 U.S. 822 (1996), citing **W.L. Gore & Assocs., Inc. v. Garlock, Inc**., 721 F.2d 1540, 1548, 220 USPQ 303, 309 (Fed. Cir. 1983), **cert. denied**, 469 U.S. 851 (1984).

On page 3 of the brief, Appellant argues that the Koto teachings cannot be used with the teachings of Saito because Koto relies on the lack of a sidewall to have the polysilicon 6 oxidized and expand to control bird's beak 5 growth. In short, the sidewall of Saito is inconsistent with the silicon nitrides sandwiched polysilicon of Koto. We note that the Examiner does not respond to this argument. See page 5 of the Examiner's answer.

The Federal Circuit states that "[t]he mere fact that the prior art may be modified in the manner suggested by the Examiner does not make the modification obvious unless the prior art suggested the desirability of the modification." **In re Fritch**, 972 F.2d 1260, 1266 n.14,

23 USPQ2d 1780, 1783-84 n.14 (Fed. Cir. 1992), **citing In re Gordon**, 733 F.2d 900, 902, 221 USPQ 1125, 1127 (Fed. Cir. 1984). It is further established that "[s]uch a suggestion may come from the nature of the problem to be solved, leading inventors to look to references relating to possible solutions to that problem." **Pro-Mold & Tool Co. v. Great Lakes Plastics, Inc**., 85 F.3d 1568, 1573, 37 USPQ2d 1626, 1630 (Fed. Cir. 1996), **citing In re Rinehart**, 531 F.2d 1048, 1054, 189 USPQ 143, 149 (CCPA 1976)(considering the problem to be solved in a determination of obviousness). The Federal Circuit reasons in **Para-Ordnance Mfg. Inc. v. SGS Importers Int'l Inc**., 73 F.3d 1085, 1088-89, 37 USPQ2d 1237, 1239-40 (Fed. Cir. 1995), **cert. denied** 519 U.S. 822 (1996), that for the determination of obviousness, the court must answer whether one of ordinary skill in the art who sets out to solve the problem and who had before him in his workshop the prior art, would have been reasonably expected to use the solution that is claimed by the Appellants. However, "[o]bviousness may not be established using hindsight or in view of the teachings or suggestions of the invention." **Para-Ordnance Mfg. Inc. v. SGS Importers Int'l Inc.**, 73 F.3d at 1087, 37 USPQ2d at 1239, **citing W. L. Gore & Assocs., Inc. v. Garlock, Inc**., 721 F.2d at 1551, 1553, 220 USPQ at 311-13. In addition, our reviewing court requires the PTO to make specific findings on a suggestion to combine prior art references. **In re Dembiczak**, 175 F.3d 994, 1000-01, 50 USPQ2d 1614, 1617-19 (Fed. Cir. 1999).

We fail to find that the references suggest the sidewall stack as set forth in Appellant's claim 27. Upon our review of Saito, we find that Figures 1a, 1b, 1c, 1d, and 1e show formation of

a silicon dioxide mask 11, conformably depositing oxidization resistant layer 13 on the mask, anisotropically etching the oxidation resistant layer to leave sidewalls 13 and etching the silicon substrate 10 to form a trench adjacent the sidewalls. Saito shows the oxidation mask consisting of oxide 11 plus sidewalls 12 as being unchanged during the growth of oxide 14.

Upon our review of Koto we find that the silicon nitride layers 3a and 3b sandwiching a polysilicon layer 6 do not have a sidewall. Koto's invention relies on growing of the oxide 4 in the substrate to also oxidize the end portions of polysilicon 6 to form oxide 10. The oxidation of the end portions of polysilicon 6 increases its volume and thereby increases the downward pressure on the bird's beak 5 of the growing oxide 4. This pressure retards oxide growth and results in a smaller bird's beak 5. This is shown in Figures 2a, 2b, 3a and 3b.

We note that Koto relies on the lack of the sidewalls to have the polysilicon 6 oxidized and expand to control the bird's beak 5 growth. Furthermore, we note that Saito relies on a completely different approach of using an oxide mask plus oxidation resistant sidewalls as an oxidation mask for growing the oxide. We fail to find any suggestion in Koto or Saito to use the Saito' method in the sidewall structure of Koto. Furthermore, upon our review of Bryant and Wolf, we fail to find these references suggest the combination as proposed by the Examiner.

In view of the foregoing, we have not sustained the rejection of claims 27, 31 and 32 under 35 U.S.C. § 103. Accordingly, the Examiner's decision is reversed.

REVERSED

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Administrative Patent Judge)
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